

The Enduring Temporal Mystery of Ornette Coleman's *Lonely Woman*

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Introduction

Lonely Woman from Ornette Coleman's groundbreaking 1959 album *The Shape of Jazz to Come* brought a completely fresh form of musical texture to jazz. The texture in which a fast-paced rhythm section, and in stark contrast, a slow moving and highly rubato hymn-like melody is established, has led to descriptions of the music being "completely free of meter,"¹ "rhythmically elastic"² or "freely pulsating in time."³ In Coleman's musical output, *Lonely Woman* became the template for a set of works, such as *Broken Shadows* (1971) and *What Reason Could I Give?* (1971), which Peter Wilson has categorized as the "Coleman Ballad" group. There have been numerous transcriptions of *Lonely Woman*, although the complexities of the unusual two-stream nature of the rhythmic and melodic material are typically avoided in favour of what Westendorf describes as "an approximation of reality"² (often in 4/4).

This discussion seeks to unravel the relationship between the rhythm section and the melodic instruments in *Lonely Woman*, using digital analysis tools. The research explores the role of synchrony in forming what has been properly described as a "unified performing aesthetic"⁴ of "seemingly opposing musical elements in juxtaposition against one another."⁵

*The Shape of Jazz to Come*⁶ was released on Atlantic records in 1959, and featured Don Cherry on Trumpet, Ornette Coleman on Alto Saxophone, Charlie Haden on Acoustic Bass, and Billy Higgins on drums. The recording session for the album took place on 22 May 1959 at the Radio Recorders in Hollywood, California. The album opens with *Lonely Woman*, a work apparently written five years earlier while the twenty-four-year old Coleman was working in a department store.⁷ During an interview, Coleman spoke of the origin of the composition:

¹ Nathan A. Frink, "An Analysis of the Compositional Practices of Ornette Coleman as Demonstrated in His Small Group Recordings During the 1970s" (MA diss., University of Pittsburgh, 2012), 41.

² Lynette Westendorf, "Analyzing Free Jazz" (PhD. diss., University of Washington, 1994), 82.

³ Frink, "An Analysis of the Compositional Practices of Ornette Coleman," 68.

⁴ Westendorf, "Analyzing Free Jazz," 64.

⁵ Frink, "An Analysis of the Compositional Practices of Ornette Coleman," 11.

⁶ Ornette Coleman, *The Shape of Jazz to Come*, with Don Cherry (trumpet), Ornette Coleman (alto saxophone), Charlie Haden (double bass), and Billy Higgins (drums), recorded May 22, 1959, Atlantic 1317, 33 $\frac{1}{2}$ rpm.

⁷ John Litweiler, *Ornette Coleman: A Harmolodic Life* (New York: Da Capo Press, 1994), 36.

Before becoming known as a musician, when I worked in a big department store, one day, during my lunch break, I came across a gallery where someone had painted a very rich white woman who had everything that you could desire in life, and she had the most solitary expression in the world. I had never been confronted with such solitude, and when I got back home, I wrote a piece that I called "Lonely Woman."⁸

Whilst most transcriptions of *Lonely Woman* have favoured what Westendorf⁹ describes as "an approximation of reality" or an indication that the horn¹⁰ players are to play freely, these suggestions imply that the metric relationships and interactions between the players were mostly the outcome of chance. Table 1 summarises the tempo, meter and performance instructions of four of the best-known transcriptions. As can be seen, there are differences in interpretation, most notably the number of beats and underlying tempo. While some variation is not unknown in transcriptions of improvised music, these potential discrepancies are the result of major disagreements relating to extremely fundamental parameters derived from a single recording. The disagreements would seem to reflect the ambiguity of pulse in *Lonely Woman*.

Table 1. Comparison of meter and tempo markings in four transcriptions of *Lonely Woman*

NOTE: Block's analysis does not include a transcription of the B section. The number in brackets shows the number of beats if Block had assumed that the missing section were thirty two beats.

	Time Sig.	Tempo	Instruction	No. of Beats
Schuller (1961) ¹¹	2/2	c. 88	Very Freely	276
Block (1990) ¹²	4/4			186 (218)*
Westendorf (1994) ¹³	2/2	c. 84	Very Freely	276
Ville (2009) ¹⁴	4/4	c. 160	Melody is played freely against time	245

Ornette Coleman's double quartets in the album *Free Jazz* (1961)¹⁵ suggest a more precise and intentional approach to multi-metre, polyrhythm, and metric

⁸ Jacques Derrida, "The Other's Language: Jacques Derrida Interviews Ornette Coleman, 23rd June 1997," *Genre* 37, no. 2 (2004): 328.

⁹ Westendorf, "Analyzing Free Jazz," 64.

¹⁰ The jazz term denoting all blown instruments.

¹¹ Gunter Schuller, *A Collection of the Compositions of Ornette Coleman* (New York: MJQ Music, 1961), 17-19.

¹² Steven Block, "Pitch-Class Transformation in Free Jazz," *Music Theory Spectrum* 12, no. 2 (1990): 196.

¹³ Westendorf, "Analyzing Free Jazz," 64-65.

¹⁴ V. Ville, "Lonely Woman," Free Jazz Institute, accessed November 14, 2015, http://freejazzinstitute.com/uploads/20100220081822_HalfNelson.pdf.

modulation. In *Free Jazz* drummer Billy Higgins is driving one rhythm section on the right channel of the audio recording in a 4/4 swing feel, whilst the other rhythm section on the left channel is driven by Ed Blackwell, simultaneously grooving with a double-time straight-eighth bebop feel. As discussed by Andrew Fogliano, these two strata of time-scales maintain a precise metric relationship throughout, although further metric modulations are implied when the bass player (in the right channel) begins to play in 3/4 during the work, creating a 3:2 hemiola.¹⁶ Despite the two different time scales evident, these two temporal structures are closely related, and perceptually tend to sound quite synchronous and fused. This would appear to align closely with Frink's¹⁷ description of a "unified performing aesthetic" of "seemingly opposing musical elements in juxtaposition against one another." In the case of *Lonely Woman*, the rhythmic texture presents a more mysterious and distant metric relationship where the temporal layers are perceived as being more independent.

In 1990, Albert Bregman—a researcher involved in experimental psychology, cognitive science, and Gestalt psychology—proposed a framework of auditory perception that he coined Auditory Scene Analysis (ASA).¹⁸ This framework proposes several key inference processes that may inform the way in which we, as listeners, perceive poly-tempo in works such as Coleman's *Lonely Woman*. The theory of ASA suggests that listeners tend to group together sounds that are perceptually similar, and segregate sounds that are perceptually dissimilar.¹⁹ Arguably, what is most relevant in *Lonely Woman* is the perception of horizontal organisation, most specifically the perception of metre in both the horns and the drums, and their relative synchrony versus asynchrony. More recent research in ASA has suggested that different auditory cues may be inferred via parallel neural channels.²⁰ A principle known as "temporal coherence" has been used to describe how coherent parallel auditory streams may be grouped as a single stream, whereas low coherence between inferred parallel streams would otherwise be perceived as more than one stream. For example, Steve Reich's *Piano Phase* (1967) tends to fall into

¹⁵ Ornette Coleman, *Free Jazz*, with Ornette Coleman (alto saxophone), Don Cherry (pocket trumpet), Scott LaFaro (double bass), Billy Higgins (drums), Eric Dolphy (bass clarinet), Freddie Hubbard (trumpet), Charlie Haden (double bass), and Ed Blackwell (drums), recorded December 21, 1960, Atlantic SD 1364, 33½ rpm.

¹⁶ Andrew Fogliano, "Collective Improvisation: Conversation, Interaction and Direction in the Music of Ornette Coleman and Jason Rigby" (Hons diss., Wesleyan University, 2009), 21.

¹⁷ Frink, "An Analysis of the Compositional Practices of Ornette Coleman," 11.

¹⁸ Albert S. Bregman, *Auditory Scene Analysis* (Cambridge, MA: MIT Press, 1990).

¹⁹ Brian Moore and Hedwig Gockel, "Factors Influencing Sequential Stream Segregation," *Acta Acustica, United with Acustica* 88 (2002): 320–332.

²⁰ Mounya Elhilali, Ling Ma, Christophe Micheyl, Andrew J. Oxenham, and Shihab A. Shamma, "Temporal Coherence in the Perceptual Organization and Cortical Representation of Auditory Scenes," *Neuron* 61 (2009): 317–329; Shihab A. Shamma, Mounya Elhilali, and Christophe Micheyl, "Temporal Coherence and Attention in Auditory Scene Analysis," *Trends Neurosci* 34 (2011): 114–123.

a single stream when the ostinatos are in rhythmic synchronization, but tend to expand into multiple streams when musical phrases are transitioning in phase. Research by Daniel Pressnitzer et al has aimed to draw parallels between visual illusions and auditory illusions such as "bistability,"²¹ a cognitive phenomenon in which certain visual or auditory stimuli can be perceived in multiple ways.²² Bregman has also remarked that auditory streaming presents a striking parallel with apparent motion, a visual stimulus that is "bistable."²³ Pressnitzer and Hupé also suggest that temporal dynamics observed in auditory stream segregation are similar to those of bistable visual perception, stating that the mechanisms mediating multistable perception might be shared across sensory modalities.²⁴

Perhaps one of the closest visual analogies to the auditory streams present in *Lonely Woman* is the Ponzo Illusion (see Figure 1), which shows that the perception of an object's length is influenced by its contextual surroundings. The lack of "temporal coherence" evident in *Lonely Woman* may contribute toward perceiving the time as having a certain elasticity, and may also support notions attributed to free jazz such as "free" time. The phenomenon of auditory "bistability" may also contribute toward explaining whether or not the horns and the drums are perceived as performing in synchrony or asynchrony.



Figure 1. The Ponzo optical illusion

Ake claims that "Early boppers developed their own "mystery" language as a means of distancing themselves from "unhip" outsiders."²⁵ A tendency to revert to mysterious explanations of performance practice have also contributed to the problem surrounding the interpretation of metre and rhythm in *Lonely Woman*. In an interview with George Russell from the documentary *Ornette: Made in America*,²⁶ it is claimed that

²¹ Daniel Pressnitzer, Clara Suied, and Shihab A. Shamma, "Auditory Scene Analysis: The Sweet Music of Ambiguity," *Frontiers in Human Neuroscience* 5 (2011): 158.

²² Sensory 'bistability' has also been described as the alternating dominance and suppression of multiple competing interpretations of ambiguous sensory input.

²³ Bregman, *Auditory Scene Analysis*.

²⁴ Daniel Pressnitzer and Jean-Michel Hupé, "Temporal Dynamics of Auditory and Visual Bistability Reveal Common Principles of Organization," *Current Biology* 16 (2006): 1351–1357.

²⁵ David Ake, "Re-Masculating Jazz: Ornette Coleman, 'Lonely Woman' and the New York Jazz Scene in the Late 1950s," *American Music* 16, no. 1 (1998): 28.

²⁶ George Russell, cited in *Ornette: Made in America*, directed by Shirley Clarke (New York: Milestone Films, 1984), videocassette.

this quartet of Coleman, Cherry, Haden and Higgins used to begin performances in perfect time and tempo without using an introductory count or even a subtle nod of the head. Indeed, the word "telepathic" is often evoked in discussions of their interaction.²⁷ In addition to the "superhuman" capabilities attributed to this quartet, Coleman, from 1972, described his unique compositional approach as "harmolodics"—a quasi-philosophical set of approaches that he claimed to be compiling into an explanatory text for much of his life.²⁸ Most of his descriptions of the system are found in the liner notes to his records. The following extract from the sleeve notes of Coleman's 1972 album *Skies of America*, is typical:

Harmolodics can be used in almost any kind of expression. You can think harmolodically. You can write fiction and poetry in harmolodic. Harmolodics allows a person to use a multiplicity of elements to express more than one direction. The greatest freedom in harmolodics is human instinct.²⁹

Not surprisingly these "unknowable" qualities have conspired to encourage analysis to end with phrases such as "completely free of meter," "freely pulsating time,"³⁰ or "rhythmically elastic."³¹

In another description of harmolodics, however, Coleman defines it as a system in which "rhythms, harmonies and tempos are equal in relationship and independent melodies at the same time."³² We will demonstrate in this analysis that *Lonely Woman* does indeed exemplify a precarious balance between independence and interdependence in the functions (lead, solo, rhythm section etc.) of the four instruments. The paper attempts to chart a course between the precise measurement of events in the recording that arguably contribute to the perception of tempo and the more human domains of rubato, musicianship, and the physical constraints of performance by examining the only definitive and determinate document of the work, the 1959 recording.

²⁷ Michael B. Cogswell, "Melodic Organization in Four Solos by Ornette Coleman" (M.Mus diss., University of North Texas, 1989), 59; Frink, "An Analysis of the Compositional Practices of Ornette Coleman," 44.

²⁸ Ornette Coleman, cited in Jari Perkiömäki, "Lennie and Ornette Searching for Freedom in Improvisation Observations on the Music of Lennie Tristano and Ornette Coleman" (D.Mus. diss, University of the Arts Helsinki, 2002), 10.

²⁹ Ornette Coleman, *Skies of America*, with Ornette Coleman (alto saxophone) and the London Symphony Orchestra conducted by David Measham, recorded April 17-20, 1972, Columbia KC 31562, 33½ rpm.

³⁰ Frink, "An Analysis of the Compositional Practices of Ornette Coleman," 41, 68.

³¹ Westendorf, "Analyzing Free Jazz," 81.

³² Ornette Coleman, liner notes for *Dancing in Your Head*, with Ornette Coleman (alto saxophone), Bern Nix (first lead guitar), Charlie Ellerbee (second lead guitar), Rudy McDaniel (bass guitar), Shannon Jackson (drums), Robert Palmer (clarinet), and Master Musicians of Jajouka, recorded January 1973–December 1975, Horizon SP722, 33½ rpm.

Analysis Methodology

Since the definitive version is a recording, an analysis of *Lonely Woman* relies on the ability to detect necessary performance details in both the horn section and the rhythm section from the recording itself. In the original recording, the loudness of the horns often mask details in Billy Higgins performance on drum kit. Whilst in a stereo mix-down, one does not have the ability to necessarily change the relative loudness of one instrument in the mix without affecting everything else, there are a number of other techniques in the practice of audio engineering that can be of use, such as phase cancellation and mid-side processes. For sound sources that have been recorded in mono, and panned centre in the mix, these elements can be phase-cancelled out of the mix by reversing the phase of one channel and mixing down to mono. In the case of *Lonely Woman*, it is possible to remove the bass and drums almost entirely by applying this phase cancellation technique, leaving only the trumpet and alto saxophone. Similarly, it is possible to reduce the level of the horns substantially by leaving only the mid and not the side components of a mid-side matrix. Upon listening, this appears to leave just a mono mix of the remaining microphones, what sounds like a figure-of-eight microphone placed in front of the drums, and an acoustic bass microphone representing an even balance of the bass and drums, and some of the horns.

A number of software tools have been used for analysing the temporal relationships of the work. Time-domain analysis techniques generally fall into a number of sub-categories: loudness analysis (i.e. peak RMS), log attack time, temporal centroid, zero-crossing rate, segmentation analysis, and transient analysis.³³ Such techniques as transient analysis have been used for beat detection of an audio source, and these methods either fall into real-time³⁴ or non-real-time approaches. A non-real-time approach has been adopted for this research,³⁵ and has been used to track changes precisely in tempo in the rhythm section, and to note onsets in the horn section throughout the work. This process has also been useful in identifying moments where the horns and rhythm section are in synchrony.³⁶ A real-time approach such as Tristan Jehan's

³³ Giovanni De Poli and Luca Mion, "From Audio to Content," in *Algorithms for Sound and Music Computing, for Computer Science Class in Sound and Music Computing*, ed. Giovanni De Poli and Federico Avanzini (CreativeCommons Attribution-NonCommercial-ShareAlike license, 2006), under "Informatica Musicale: dispense anno 2007-2008 e 2006/07," <http://www.dei.unipd.it/~musica/IM06/Dispense06/riferimenti06.html>.

³⁴ In computer science, real-time operating systems are those that respond to input immediately. Refer to Christopher G. Morris, ed., *Dictionary of Science and Technology* (Elsevier Science & Technology: Academic Press, 1992).

³⁵ Avid *ProTools* software has been used with its "tab-to-transient" and "identify beat" functions.

³⁶ It is possible to place markers on the timeline to indicate significant structural moments.

beat~ object³⁷ in *MaxMSP* allows for tracking these tempo changes on-the-fly. Another solution is Adam Stark's Beat Tracking Evaluation Toolbox.³⁸

Rhythmic Analysis of *Lonely Woman*

There are several key questions that are worth addressing. Firstly, should we assume that all performers are performing freely? Can we assume that previously notated versions have accurately represented the relative tempi of horns and bass versus the drum kit? Are all musical elements elastic in time, or some more strict than others? Is there a strict metric relationship between the different parts, and can it be quantified? Finally, is the synchrony between the horns themselves determined by the bar structure of the drums, by some other technological means, or can it simply be attributed to sheer musicianship?

Explorations in cross-rhythm, implied time, and metric modulation became useful devices in jazz rhythm sections of the early 1960s. Examples include John Coltrane's ensemble featuring McCoy Tyner, Jimmy Garrison, and Elvin Jones, as well as Miles Davis's ensemble featuring Herbie Hancock, Ron Carter, and Tony Williams. This was not only influenced by the syncopation and polyrhythm already evident in jazz, but also by other influences taken from Latin, Cuban, and Brazilian music. Common rhythmic interrelationships explored included 6:4, 2:3, 4:3, 9:6 metric relationships, as well as polyrhythms such as 3/4 in 4/4 time, or 4/4 in 3/4 time.³⁹ However, in the context of poly-tempo work, and with exception to examples in Western Art Music such as Charles Ives, Karlheinz Stockhausen, and Henry Brant, Ornette Coleman might be considered an innovator by placing these techniques in the spotlight in jazz music as early as 1959 in his album *The Shape of Jazz to Come*.

From the outset it would appear that the horns are playing a stately 120 BPM whilst the drummer is playing a fast breakneck bebop-style groove in 4/4 at approximately 320 BPM; mathematically this would represent a more distant metric relationship of 8:3, however the extent to which this might represent a deliberately cultivated polyrhythm is difficult to determine. This metric displacement is most evident in the B section of the head where the trumpet appears to be playing 3/4 per note whilst the drummer is playing two bars of 4/4. However, an analysis of the tempo of the drummer indicates a tempo that is pushing and pulling against the other elements. Of the 401 bars of 4/4 in the drums (see Figure 2), the tempo sits between 299 and 337 BPM,

³⁷ Tristan Jehan, "Event-Synchronous Music Analysis/Synthesis" (paper presented at the 7th International Conference on Digital Audio Effects, Naples, Italy, 2004).

³⁸ Matthew Davies, Norberto Degara, and Mark Plumbley, "Evaluation Methods for Musical Audio Beat Tracking Algorithms," Queen Mary University of London, Centre for Digital Music, Technical Report C4DM-TR-09-06 (2009). See also <http://www.adamstark.co.uk/beat-tracking-evaluation-toolbox/>.

³⁹ John Riley, *Beyond Bop Drumming* (New York: Manhattan Music, 1997).

often stabilizing at approximately 327 BPM and an average mean tempo of approximately 325 BPM. Significant shifts in tempo are evident at sectional changes, for example the first B section in the head where the tempo drops down to almost 315 BPM, and the beginning of the solo section where the tempo again shifts down to 315 BPM.

By time-stamping the 4/4 bar structure in the drums, taking into consideration these natural tempo shifts, it is possible to map out where the horn entries line up with this metric structure, and how each phrase is extended or shortened throughout. Whilst phrases 1 and 2 of the head tend to shorten through the length of the work, phrases 3 and 4, on the other hand, tend to become elongated, allowing for expressive rubato in the alto saxophone and for further interaction between the horns and the rhythm section. For example, Billy Higgins emphasises a metric modulation of 1:3 by stretching the swing ride-rhythm from the crotchet pulse, to an implied dotted minim pulse, implying a tempo of 109 BPM from the then stabilised tempo exhibited (327 BPM). This 109 BPM is relatively close to the hypothesized 120 BPM suggested in the horns.

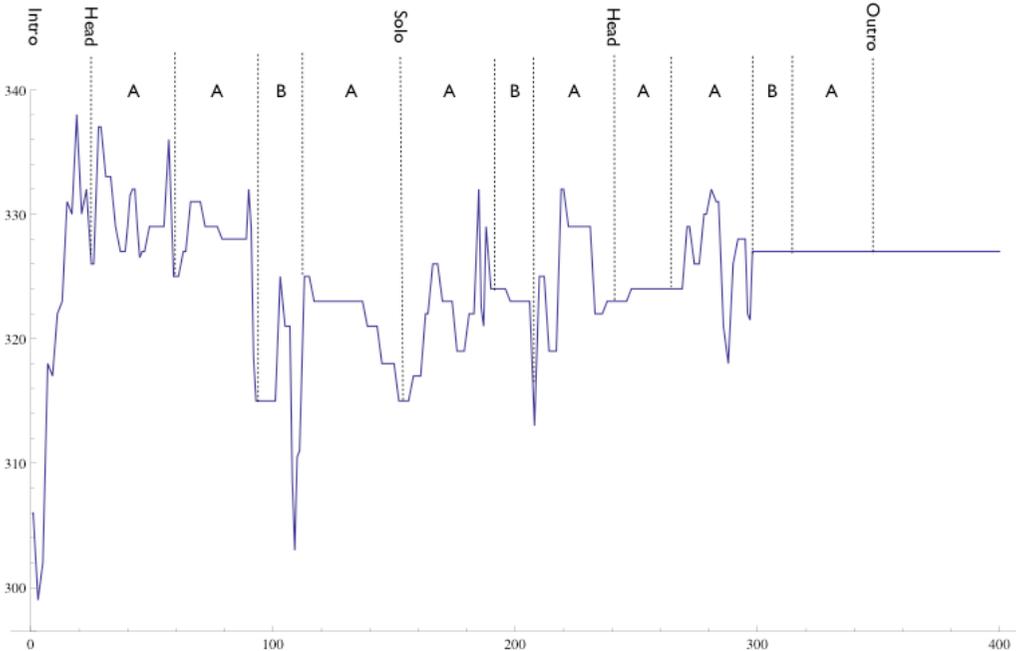


Figure 2. Tempo-tracked changes in *Lonely Woman*

Table 2. Shortening and elongation of phrases in the head of *Lonely Woman*

	Head 1	Head 1 1 st Repeat	Head 1 2 nd Repeat	Head 2	Head 2 1 st Repeat 1	Head 2 2 nd Repeat
Phrase 1 (beats)	10	10	10	9	8	9
Phrase 2 (beats)	8	8	8	7	8	7
Phrase 3 (beats)	11	11	12	11	11	11
Phrase 4 (beats)	11	10	10	11	10	11
Phrase 5 or 6 (beats)	10	10	10	9	9	12 + CODA
TOTAL Beats	50	49	50	47	46	50 + CODA

The horns themselves are written in a harmonic minor key with blue notes on the 3rd and 5th degrees of the scale, similar to the New Orleans-like blues found in Jimmy Cox's *Nobody Knows When You're Down and Out* (1923), which was popularised by jazz singer Bessie Smith, and in Joe Primrose's *Saint James Infirmary Blues* (1929). Arguably a reason for the appropriation of the saxophone by jazz players was the instrument's vocal quality, and the relative ease with which the pitch of any given note can be manipulated or 'bent,' thus imitating the flexibility of the human voice. For musicians who had the sounds of the blues firmly in their inner ears, the saxophone's vocal quality, and its capacity to imitate these 'blue' vocal lines, would have appeared very attractive; indeed, the 'moaning' and 'wailing' sounds that distinguish the blues would later become iconic of the saxophone itself.⁴⁰ Charlie Haden, on double bass, provides a harmonic underpinning for the work, the part often involving two-note chords, and emphasising the tonic and dominant relationships, establishing a clear sense of tension and release throughout the work. Each entry of the A section (see Figure 3) appears to have a different alignment with the drums, but there are some clear similarities in each 'variation.'

In this first instance of the A section of the head, the horns and bass appear to come in a little after the downbeat, more closely lining up with beat 2. If we are to assume the horns are playing a different tempo at 120 BPM, this would approximate a 14:5 metric relationship, what would be considered by most musicians as too complex to be practically attempted. This suggests, rather, that it was more a matter of synchronising arrival points. We could also argue this section from the perspective of the tempo of the horns in 3/4 (as quantized by the rhythmic subdivisions of the drums shown in Figure 4).

⁴⁰ Stephen Cottrell, *The Saxophone* (New Haven: Yale University Press, 2013), 186; Coleman, "Skies of America."

Figure 3. A note-for-note transcription of the first A section in the head from the perspective of the drums

Figure 4. A note-for-note transcription of the first A section in the head from the perspective of the horns

However, the horns tend to play quite freely, particularly Don Cherry's entries on the trumpet, and the interpretation of these lines, particularly given jazz rhythmic language and phrase structure, are arguably open to interpretation. This is further supported by how the nuances and rhythmic phrasing are varied each time. The third playing of the head, from the point of view of the drummer's metric structure, is a little more in synchrony. This repeat initially constitutes a 13:5 metric relationship, a slower metric relationship than before, and also a relationship that is too complex to be systematically attempted, again suggesting that the relationship is the byproduct of attempts to synchronise arrival points. This altered metric relationship is supported by the reduction in tempo as Billy Higgins slows after the first playing of section A versus the first repeat of A (see Figure 5).

Given the amount of phrasing variation, and the tempo elasticity of the drums, it is difficult to assume what the definitive version of the head is. The variability of jazz rhythmic phrasing, like *inegale* in French Baroque music, has many variations of rhythmic nuance ranging from strict duplet and trochaic triplet-like figurations, to double dotted rhythms. Analyses of the metric proportions between the drummer's tempo and the horns at 120 BPM tend to settle most commonly on an 8:3 metric relationship, or an approximation of such a relationship. The opening phrase of the head thus might read more appropriately as shown in Figure 6.

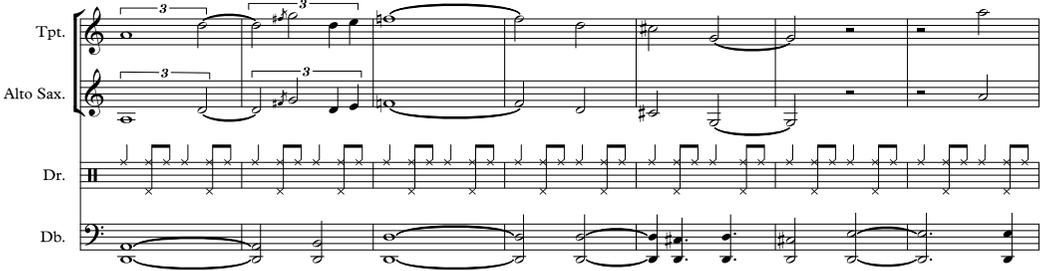


Figure 5. A note-for-note transcription of the A section repeat in the first head from the metrical perspective of the drums



Figure 6. A note-for-note transcription of the A section repeat in the first head from the metrical perspective of the horns

Identifying the synchrony between both elements requires one to make some assumptions. The tempo changes, and the metric structure in the drums, is something more indisputable, given the idiomatic approaches to playing the instrument and the clear 4/4 bar structure that is evident in Billy Higgins's performance. However, the question ultimately is whether or not the synchrony between the horns themselves is determined by the bar structure of the drums or by some other means. Separating the recording of the horns allows one to observe the phrasing structure in the horns in isolation. The beginnings of horn phrases and accents tend to land very closely to a 120

BPM tempo map. What is most surprising is that this synchrony between the horns and a 120 BPM click remains relatively consistent throughout, most evident in the B section of each playing of the head. Nevertheless, there is no evidence to suggest that any synchronization devices were used, and this would seemingly move against the grain of traditional jazz performance practice, not to mention established notions of "free jazz." Furthermore, research into the auditory perception of tempo has conclusively suggested that 120 BPM is a more commonly perceived tempo in music (see Figure 7), and this would support the idea that 120 BPM may more likely be attributed to *Lonely Woman*.⁴¹

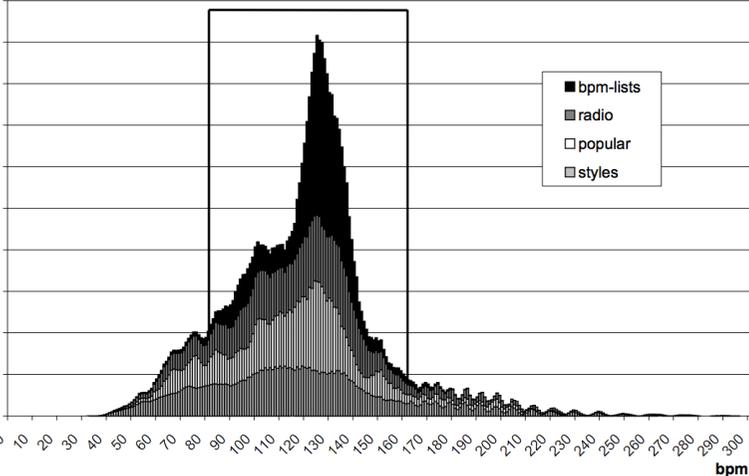


Figure 7. Distribution of the tempi as perceived in four sets of musical pieces. The black frame indicates the 'preferred octave' (Source: Moelants, 2002)

In applying a consistent 120 BPM click to the variable time-stamps of the drum part, it is possible to see how these different temporal structures align. These have been filtered to all metric events that occur within the duration of 50 milliseconds. Whilst the application of the 120 BPM click may be novel, there are a strong number of events that line up, particularly the accents in the B section. This is clearly demarcated by Billy Higgins, where he plays fills and accents that anticipate or punctuate horn entries or changes in the sectional form. Most importantly, these points of synchrony line up with key structural changes such as the repeat of the head, statements of phrases in the head, the statement of the B section, the tacet just before the second repeats of section A, the demarcation and entrance into the alto solo, the demarcation of the return of section A in the alto solo, punctuation of specific rhythms by the drummer during the alto solo, and

⁴¹ Dirk Moelants, "Preferred Tempo Reconsidered," *Proceedings of the Music Perception and Cognition Conference* (2002): 580-583.

the statement of each phrase in the coda. Figures 8a and 8b illustrate these changing relationships across *Lonely Woman*'s complete form.

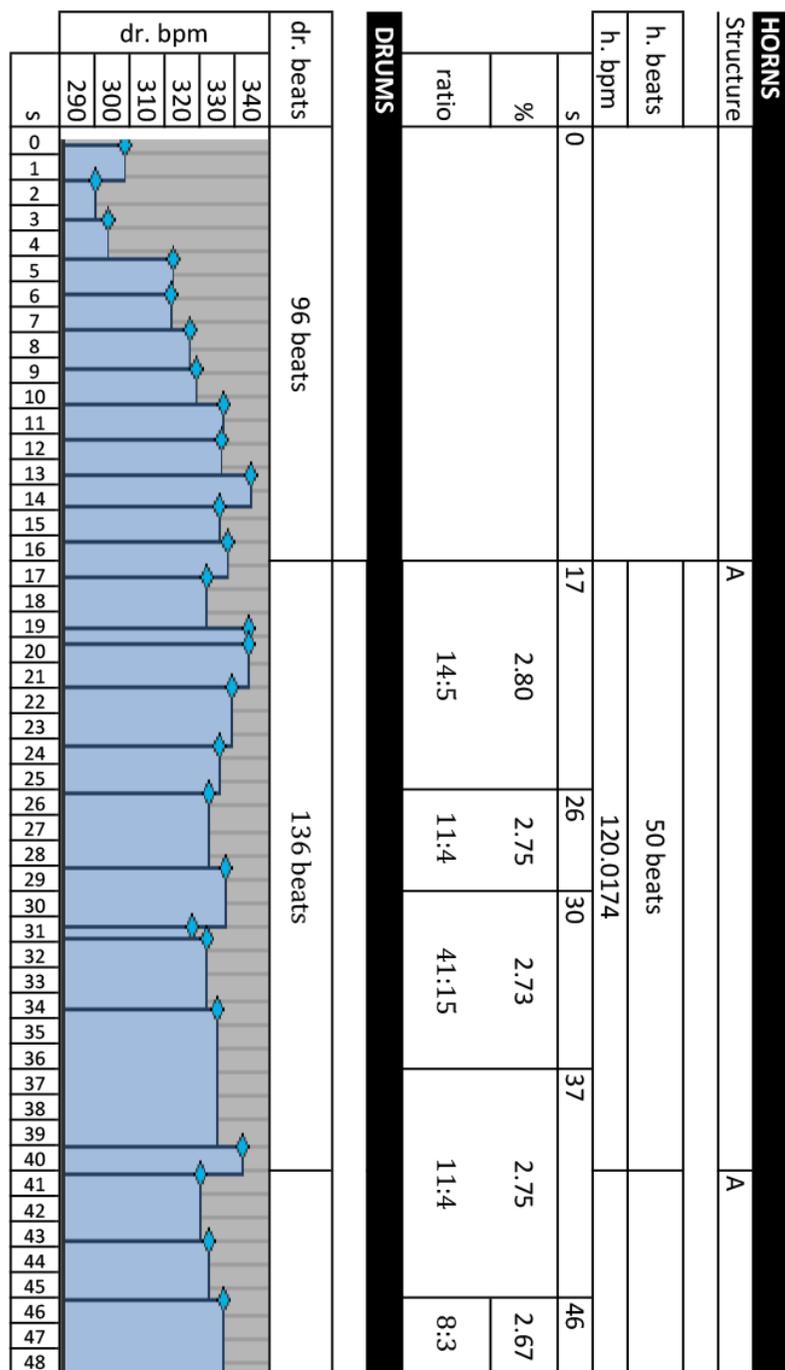


Figure 8a. An overview of metric relationships between the horns and drums in *Lonely Woman* in bars 1-48

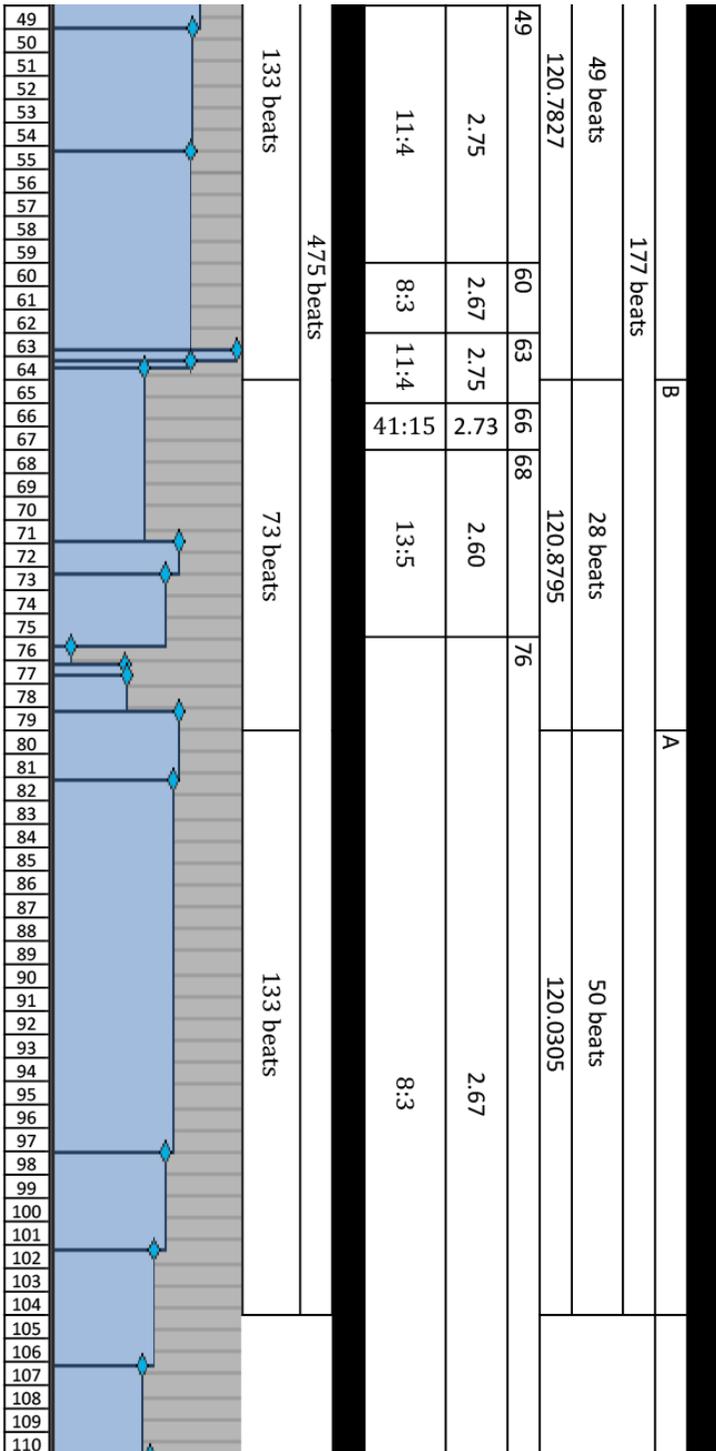


Figure 8b. An overview of metric relationships between the horns and drums in *Lonely Woman* in bars 49-110

Conclusion

This discussion seeks to precisely unravel the relationship between the rhythm section and the melodic instruments in the 1959 recording of *Lonely Woman*, using digital analysis tools. It aims to uncover the role of synchrony and asynchrony in forming what has been properly described as a "unified performing aesthetic" of "seemingly opposing musical elements in juxtaposition against one another."

Returning to some of the research questions proposed earlier: should we assume that all performers are performing freely? Some of the conclusions of this research would suggest that we cannot assume that all performers are necessarily performing freely. On the other hand, given the apparent complexity of some of the resultant polyrhythms, it is still reasonable to assume that they are formed accidentally. Can we assume that previously notated versions have accurately represented the relative tempi of horns and bass versus the drum kit, and are all musical elements elastic in time, or some more strict than others? We can state unequivocally that previous transcriptions have not accurately represented all elements, and that includes the relative tempi of the horns versus the drum kit, and the relative role of the bass in bridging between these two tempo structures. The problem is that these relationships are always in flux due to the tempo shifts in Billy Higgins's performance, which means that each version of the head is considered quite unique based on variable metrical relationships. What is the metric relationship between the poly-tempi exhibited, and how consistent and reliable is this observation? It is possible to see over-arching tempo and metric relationships within phrases (distinguished by synchronized points of arrival), and the average mean tempo ratio tends to fall mostly in an 8:3 metric relationship. Finally, is the synchrony between the horns themselves determined by the bar structure of the drums, by some other technological means, or by sheer musicianship? Without any evidence of time-synchronising devices, the phrase synchrony explored in the performance in *Lonely Woman* seems to be attributable to the high degree of musicianship in the ensemble. Billy Higgins masterfully pushes and pulls the time in order to manipulate the tempo to land more closely in synchrony with the phrasing of the horns.